

MASSACHUSETTS DEPARTMENT OF FIRE SERVICES HAZARDOUS MATERIALS EMERGENCY RESPONSE DIVISION

MASS DECONTAMINATION

**A MULTI-PHASED RAPID RESPONSE APPROACH
FOR THE
COMMONWEALTH OF MASSACHUSETTS**



Mass Decontamination A Multi-Phased Rapid Response Approach for the Commonwealth of Massachusetts

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Mass Decontamination

A Multi-Phased Rapid Response Approach for the Commonwealth of Massachusetts

INTRODUCTION

Concerns of chemical and biological weapons and their potential use by terrorist and criminals in the United States has resulted in a renewed interest in the ability to decontaminate large numbers of civilians and emergency responders. To prepare for such exigencies, Congress has allocated significant sums of federal dollars through grants to law enforcement, the fire service, emergency medical services and emergency management to develop or expand capabilities in crisis and consequence management for incidents resulting from acts of terrorism.

Because chemical weapons are, by definition and characteristic, hazardous materials, a major objective of federal funding has been to enhance the response capabilities of hazardous materials units. 1999 grant moneys were almost solely targeted to the acquisition of hazardous materials response equipment at the city and county level. While most Massachusetts counties that qualified for these grants opted for the sole exception of communications equipment, some requested the purchase of chemical protective clothing and meters. A few areas sought recommendations from the Department of Fire Services and opted for a modular decontamination system designed by the departments Hazardous Materials Response Division (see appendix "A").

In the early part of 2000, the Department of Justice (DOJ) held a series of regional seminars for emergency planners to outline the future funding strategies of domestic preparedness efforts. The plan described channels all future grants through the states and not directly to counties or cities. This grant program is scheduled for a three-year cycle. Phase one of the grant process requires an assessment by states and their jurisdictions of the threat, possible targets and current capabilities and needs. Following this multi-disciplinary assessment, states are required to submit a three-year plan to improve capabilities.

While the focus of federal grant money is much broader, in recognition of the need for greater health care development and law enforcement assessment and intervention, much of the focus remains on the development of hazardous materials response. In this aspect, Massachusetts is well ahead of most of the nation by virtue of state level support.

The six hazardous materials response teams of the Department of Fire Services, Hazardous Materials Response Division provides a greater capability and more consistent response to the entire state than other state or regional response systems. This capability means that all communities, not just the major urban areas, have immediate access to a fully equipped hazardous materials response team. Of those regional Hazmat response systems represented at the DOJ seminar attended by Massachusetts representatives, none could project a response time throughout their state equal to that of Massachusetts, similar anecdotal information was found at the International Association of Fire Chiefs (IAFC) Annual Hazardous Materials Conference in Maryland.

In addition to its advantage of response time, the Massachusetts system generally has a higher level of initial training, a broader array and more modern equipment. Through its tiered level response the state system provides Massachusetts communities with access to more equipment than other systems.

A new addition, the locally developed Mass Casualty Decontamination system, again sets Massachusetts ahead of other programs. This system was presented and enthusiastically received as superior at the previously mentioned IAFC hazardous materials conference. It is important to note that this capability has been built by the Commonwealth, the Fire Chiefs and Professional fire fighters without federal grant money. While a credit to the state, our existing capabilities will limit the Hazardous Materials programs ability to qualify for federal grant money, as the needs may not be reflected in the initial analysis.

A more pragmatic examination of the possible scenarios involving mass casualty contamination reveals both a need and an opportunity. While the current Hazmat response system allows us to place an operating Hazmat team on scene within one hour, the need for multiple units is probable in a mass casualty contamination scenario given a lack of mass decon capability at most hospitals.

The table of response times (appendix "B") illustrates estimated response time for each hazardous Materials Operational Response Unit to each hospital in Massachusetts. While the table presents a fairly optimistic picture for most hospitals in terms of response time, it must be noted that this represents only the unit and not necessarily the staff to support it. Because out-of-district responses necessary to support this level of response will require members to respond in either local department vehicles or private vehicles the Hazmat unit will likely arrive well ahead of sufficient staff.

The real danger of chemical or biological weapons lies in their harm to persons. The first solution is to prevent exposure by denying access and the second to reduce the exposure through decontamination. Reduction in the time of exposure to any product reduces the dose delivered and hence the effect. Even though chemical and biological weapons are difficult to weaponize, the resulting panic from their presence or perceived presence can result in a large-scale emergency. This can be evidenced by the fact that of eight fatalities from the Tokyo subway attack, only one was reported as a result of exposure to the chemical agent.

Accordingly, even the response time of the Massachusetts Hazmat system may be seen as insufficient to decontaminate those who can extricate themselves from an effected area and those who may believe, however falsely, that they are contaminated. The resulting panic could conceivably make the Hazmat response inconsequential as persons disperse to seek their own method of treatment and decontamination.

What is necessary is a phased response system to provide for decontamination of great numbers in a manner that maintains control of the incident, reduces exposure of exposed persons and prevent the possible spread, by contaminated persons, of chemical or biological agents. This proposal seeks to address this need through a multi-phased response system. The proposed system allows for the immediate initiation of decontamination by true first responders and builds the decontamination response to providing the ability to access, decontaminate and treat increasingly contaminated and effected persons, including those who cannot extricate themselves or be safely extricated by first responders. Additionally, this proposal seeks to provide for decontamination capability at those hospital facilities that may receive patients from the local EMS system or by self-transportation.

PHASE ONE – LOCAL FIRE DEPARTMENT – DECONTAMINATION

In any emergency resulting from the release of a chemical or rapid acting biologic agent, the local fire department will likely be an initial and immediate responder. As such, it stands to reason that much can be achieved toward successful management and resolution of the incident by these local departments providing effective measures can be taken.

Efforts within the fire service and terrorism response community have identified a method for rapid gross decontamination of large numbers of persons¹. This system utilizes master streams and hand lines from fire apparatus under low water pressure. The objective of the system is to create a high volume wash corridor, through which many people can walk quickly. While it is recognized that this does not provide full and final decontamination for those who may be grossly contaminated versus exposed, it limits or prevents panic by initiation of immediate action and greatly reduces true contamination.



Fig. 1 – Decon Trial at DFS

This process achieves four objectives:

1. Initiates controls over those that may have been exposed or contaminated.
2. Removes most of an agent from those who have been contaminated
3. Reduces panic by initiating definitive action and gives cause for effected individuals to remain on site.
4. Allows time for triage of those who were exposed, versus contaminated, versus worried.

Importantly, no new equipment is required for this process at the local level. Studies by the U.S. Army Soldier Biological and Chemical Command (SBCCOM) have suggested that fire fighting protective clothing can protect against contamination by chemical weapon agents and can be enhanced by simple taping of openings in the clothing². While this study suggests that fire fighters protective clothing may be sufficient for short-term entry into a contaminated area, this plan makes no such recommendation.

Fire fighters engaged in this mass decontamination process must be in a non-contaminated area and should avoid contact with contaminated or potentially contaminated persons. Following decontamination, a determination must be made as to the relative risk of residual contamination and an

appropriate level of protective equipment to be worn during further decontamination or treatment activities.

In trials made of this technique at the Massachusetts Department of Fire Services/Mass Firefighting Academy on August 4th of 2000 using members of the state HazMat team (see Fig 1). The objective of these trials was to determine the true time necessary to implement the system from decision point to water flow.

¹ See Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident – U.S. Army SBCCOM - http://dp.sbccom.army.mil/fr/cwirp_guidelines_mass_casualty_decon_download.html

² See guidelines for Incident commanders Use of Firefighter Protective Ensemble (FFPE) with self-contained Breathing Apparatus (SCBA) for Rescue Operations During a Terrorist Chemical Agent Incident- U.S. Army SBCCOM - http://dp.sbccom.army.mil/fr/cw_irp_final_incident_command_download.html

Inadvertently, the trial handicapped itself to the lowest possible capabilities. While using three pieces of apparatus, two engines and one ladder, we had only staffed enough to assign two members to each piece.

The trial was further handicapped in that the ladder reserved for the day was not “pre-piped,” A pre-piped ladder has the master stream “ladder-pipe” already attached and requires no hose to be run up the ladder. Newer ladder trucks generally are pre-piped as a time saving measure. Finally, this ladder, being an older model, could not be lowered to the optimum level.

Despite the handicaps and with only a single walk-through members were able to implement the procedure without difficulty. From a standing location outside of the designated site, all equipment was in place with all line running in 8 minutes and 59 seconds. This time also included an intentional delay of one minute and seventeen seconds for the second engine and the ladder.

As of this date, steps have been initiated to begin a widespread delivery of training for this procedure to Massachusetts’s fire departments. It is anticipated that nearly 50 such training sessions may be conducted in the next year.

PHASE TWO-“A” – FIRE DISTRICT DECONTAMINATION COMPANIES – ON-SITE DECONTAMINATION

As the decontamination process initiated at the local level progresses, some victims will be identified as contaminated or probably contaminated. For these victims, it is necessary that a more thorough decontamination process be initiated. Again, time is critical since effect will be largely a factor of dose times time.

While the state hazardous materials team will likely be in response and may be arriving, it is necessary that several functions occur simultaneously, including:

- Assessment
- Rescue
- Medical Treatment & Transportation
- Technical decontamination
- Mitigation

The multitude of functions necessary would cause a prioritization of Hazmat operations and would likely result in the activation of multiple teams and/or significantly delay in some actions. The addition of decontamination companies within fire departments of each of the 15 fire districts can significantly enhance operations by reducing response time and initiating decontamination of self-extricated victims. This addition has several significant benefits:

- Decreases time to decontamination of self-extricated victims thus reducing time-to-treatment
- Reduces the commitment of Hazmat personnel for decontamination
- Allows Hazmat resources to be focused upon any victims remaining in the contaminated area and thus
- Speeds rescue of those victims remaining in the contaminated area
- Allows Hazmat resources to be focused on mitigation, thus reducing the risk of further persons being contaminated

- Reduces the risk of secondary contamination from persons leaving the scene.

It is proposed that one decontamination company (Engine Company within an existing full-time fire department) be designated and equipped as the Fire District Decontamination Company. Such designation would result in 15 “decon companies” within the state or roughly 2.5 times the number of Hazmat teams³. “Decon” companies would be equipped with approximately the same equipment as previously identified in Appendix A. The provided equipment would be stored on trailers and maintained in a ready state by the local department.

Including the trailers, it is estimated that each decon company would cost \$20,000.00. The total cost for this aspect of the program is approximately \$ 300,000.00 (\$20,000.00 X 15 companies). It is proposed that this equipment be funded by the FY 2000 DOJ Terrorism grant.

Each fire department that received equipment through this grant process would be required to enter into agreement with the state to maintain the equipment and to make it immediately available upon request. Each would also be responsible to have its personnel trained in decontamination procedures and to maintain such training.

PHASE TWO-“B” – HOSPITAL DECONTAMINATION COMPANIES

It has long been recognized that a significant risk exists that hospitals will receive contaminated patients at their emergency departments. While some hospitals have developed a decontamination capability for single patients few, if any, presently have the ability to decontaminate multiple simultaneous patients. The issues for hospitals relative to developing a mass decontamination capability appear to be multiple and significant. These issues include initial staff training, turnover, training maintenance, proper equipment storage and access, and the fact that operating such a system will tax the available personnel when the hospital also requires additional personnel to manage the multiple casualty aspect of the situation.

It is proposed that additional fire department decon companies, as described in the previous section, be developed and designated to hospital emergency departments throughout the state. Upon activation, by either a large-scale system activation or request from a specific hospital, these decon companies would respond directly to pre-designated hospitals. The decon companies would be based in those communities that have hospital emergency departments, thus enabling a rapid response.

Planning with hospitals will be necessary to assess the availability of power and water at designated locations, though the decon systems can operate independent of either being supplied by the hospital. Hospital plans should also include a process to “lock-down” the hospital entrances to insure that all contaminated patients are directed to the decon area.

Under a scenario where a mass contamination incident occurred in a community that has a designated hospital decon unit, that unit can respond to the scene and the district decon company cover their designated hospital. (Note; in point of fact this can be further developed to insure that the closest units respond to the local hospital and that coverage of all designated locations be accomplished through a system-wide “move-up” plan)

³ There are 15 fire districts in Massachusetts and 6 HazMat Districts

There are 67 hospital emergency departments in Massachusetts⁴. To provide a full coverage of all emergency departments 67 additional decon companies are needed. Based upon the estimated costs of the units expressed in the previous section, the cost to equip this aspect is \$1,340,000.00 (\$20,000.00 X 67). The combined equipment cost for this program is then \$ 1,640,000.00. If implemented over the full three years of the grant cycle, the annual grant costs are \$ 546,666.66.

It is important to note that the DOJ grants do not provide money for training. Training for the designated decon companies must be funded either through continued grants by the National Fire Academy or by some combination of state and local funds.

HAZARDOUS MATERIALS TEAM RESPONSE

The Massachusetts Department of Fire Services manages the statewide Hazardous Materials Emergency Response (Hazmat) system (see Appendix C). The state Hazmat system is comprised of six- (6) district Hazmat teams located throughout the state. Each Hazmat team consists of between 40 and 70 firefighter/Hazmat technicians and support personnel. Based upon geographic area, each district has either one or two “Operational response Units” (ORUs) and one “Technical Operations Module” (TOM).

An ORU is the Hazmat equipment vehicle that carries all personal protective equipment (PPE) and control equipment for the teams. The Table of Response Times in Appendix B reflects the time for each of these units to respond to each hospital emergency department in Massachusetts. This table was created to allow a hypothetical mobilization time to respond to a mass casualty contamination anywhere in Massachusetts whereupon both the incident and the surrounding area hospitals required decontamination capability.

Equipment levels on each ORU allow for six (6) entries into an “immediately dangerous to life and health” (IDLH) atmosphere and/or multiple entries into less severe environments. Recently purchased equipment will soon be added to these units to allow the application of agent neutralizing foam to an area for hazard mitigation. This capability will enable an effected area to be rendered safe, thus reducing the risk of cross contamination during emergency operations.

Each ORU carries identical equipment, including the new mass casualty decontamination system. The Mass Casualty Decontamination System consists of a set of tents, decontamination pools, heaters, lights, water manifolds, hoses and wands to decontaminate casualties from hazardous materials incident. At the heart of the system is a ingenious rail system that allows for the free movement of litter-borne casualties through decontamination without moving parts. It is largely this component and the size of the system that differentiate it from those systems recommended for the decon companies. Based upon controlled testing of this system it is estimated that a “pass-through” rate of 30 litter-borne patients an hour/per ORU⁵ is reasonable to expect. An additional unique and desirable feature of this system is that it can be simultaneously used to decontaminate litter patients, ambulatory patients and emergency personnel.

⁴ Source Massachusetts Emergency Medical Services Regions

⁵ Three Hazmat Districts have 2 ORUs and three have 1 ORU. In a Tier 4 response additional ORUs will respond from other districts, see appendix A for timetables.

As previously discussed, while the Table of Response Times suggests that all nine ORUs could be brought to bear upon such an incident anywhere in the state in about three hours, this does not reflect the time necessary to assemble the response personnel necessary to operate as a team. Hence, the response of the units may be irrelevant. Additionally, this response time would not be adequate to maintain control over such an incident or the panic that may result.

The six (6) Technical Operations Modules are also located throughout the state, one per Hazmat district. TOM units are the science and control units for each Hazmat team and contain the chemical detection meters and communications equipment for the teams. The Massachusetts Hazmat teams are among the best equipped in the nation, including detection equipment. Each TOM unit carries the chemical detection devices listed below:

- Drager CDS Kits
- Drager Accuro Bellows Pumps
- Drager Accuro 2000 Programmable Unit
- Biosystems PhD Ultra 4 Gas Detector
- (Oxygen, Carbon Dioxide, Hydrogen Sulfide, LEL)
- RAE Systems ToxiREA Pocket Photoionization Detector
- (With 10.6 e V Bulb)
- RAE Systems MiniRAE 2000 Photoionization Detector
- (With 10.6 e V Bulb)
- Ludlum model 2241-2 Dual Detector Digital Scaler/Ratemeter with
- Ludlum Model 44-2 Gamma Scintillator
- Ludlum Model 44-2 Alpha, Beta, Gamma Detector
- S.E. Internationals' Radiation Alert Dosimeters and Charger
- Microsensor Systems Inc. SAW MiniCAD mkII
- Environmental Technologies Group:
- ADP 2000 Chemical Agent Detector with Radiation Capabilities
- Bio-Detection Immunoassay
- M256A1 Detector Kits
- "HAZ CAT" Field analysis Kit
- Dieter-Heinz Field Analysis Kit
- Spilfyter Chemical Classifiers
- Spilfyter Wastewater Classifiers

Some districts also have:

- Industrial Scientific TMX 410 and TMX 412 Multigas Detectors
- Foxboroughs' Century Organic Vapor Analyzer Model 128

The Division also has one Inficon Hapsite Portable Gas Chromatograph/Mass Spectrometer.

While the entire response to a mass casualty contamination may not be adequately managed by the Hazmat system alone, on-scene measures can be well managed with regard to detection, rescue and mitigation efforts. These capabilities are significantly enhanced by the addition of the preceeding system developments.

NATIONAL GUARD, CIVIL SUPPORT DETACHMENT

The Massachusetts National Guard has attached to it the First Civil Support Detachment (1st CSD) which exists specifically to assist in the detection and management of nuclear, chemical or biological acts of aggression. The 1st CSD and the DFS Hazmat Division have engaged in planning and entered into agreement to assure effective and coordinated response efforts (see Appendix D).

Through this planing effort, it has been identified that the 1st CSD does not have a primary casualty clearing or decontamination role and hence are largely not a factor in the Mass Decontamination system. They do however bring resources and abilities to bear upon such incidents as to contribute to the overall resolution of the incident and hence increase the capabilities of other participating elements, such as the Hazmat Team. The 1st CDS also bring unique capabilities regarding product verification. The specific mission and capabilities of the 1st CDS are outlined as follows:

MISSION: Rapidly deploy to a suspected terrorist use of weapon(s) of mass destruction to **Assess** a suspected nuclear, biological, chemical or radiological (NBC/R) event in support of a local incident commander; **Advise** civilian responders regarding appropriate action, and; **Facilitate** requests for assistance to expedite arrival of additional state and federal assets to help save lives, prevent human suffering and mitigate great property damage.

ORGANIZATION: 22 Person Detachment

Command Team

Operations Team

Communications Section

Administrative/Logistics Section

Survey Team

Medical Team

VEHICLES: 8 Commercial Vehicles

2 – Full Size Crew Cab Pickup Trucks, with Dual Wheels

3 – Extended Vans

2 – Suburban SUVs

1 – GMC 6500 Series Truck with Shelter & Dish

RELEVANT EQUIPMENT:

Level A, B, C

SCBA (1 hour)

Rebreathers (2 hour)

Protective Masks with C2 canisters

Portable Gas Chromatograph/Mass Spectrometer

Chemical Alarms and Detectors

Cameras

Sampling Kits (Solid, Liquid, Swipe)

Radiation Detectors and Monitors

Organic Decon Capability

Mobile Analytical Laboratory System (MALS)

Sample and Slide Preparation and Handling

Chemical Identification

Biological Identification

Isotope Identification

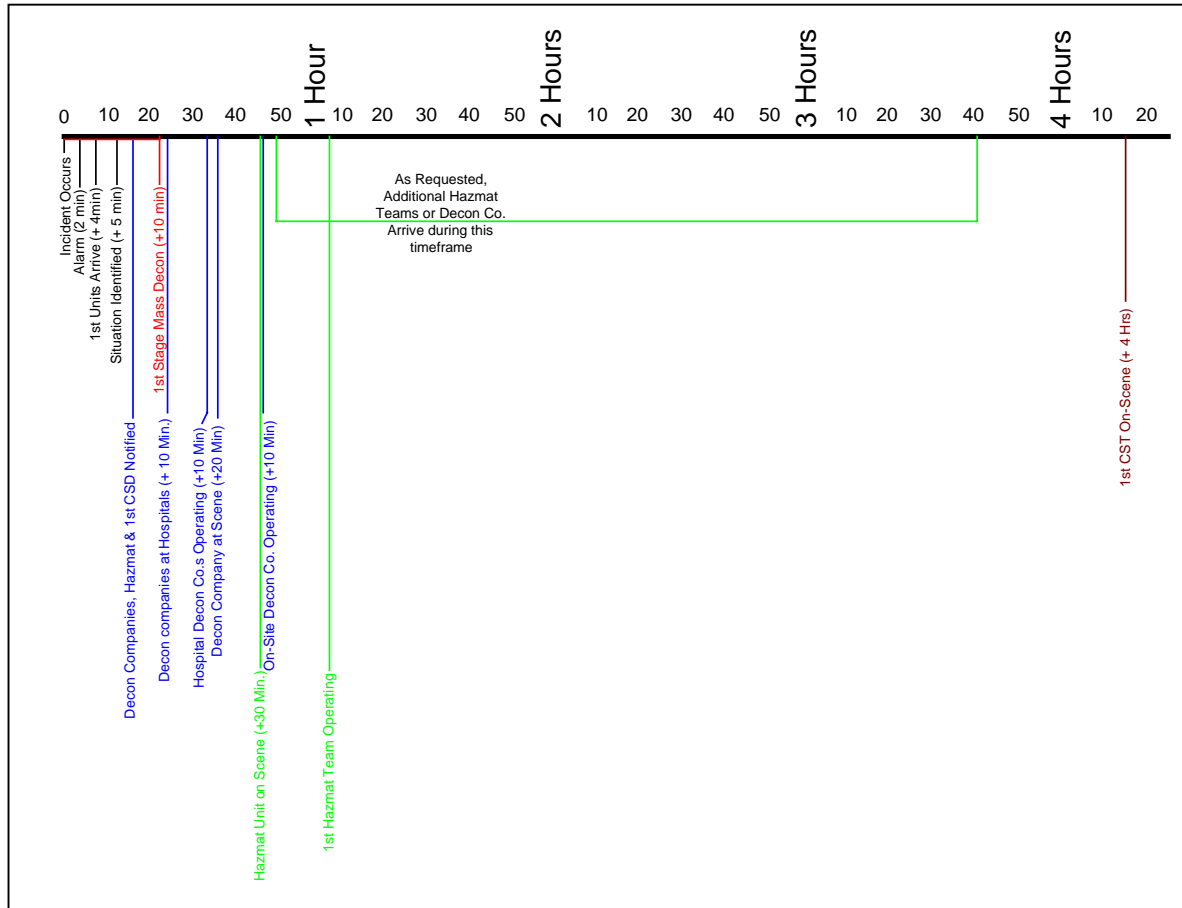
Unified Command Suite

Reachback Communication to State and Federal Agencies

Modeling Software

RESPONSE TIMELINE

The objective of this plan is to provide a rapid and definitive response to incidents of mass casualty contamination from nuclear, chemical or biological agents. The measure of this systems effectiveness clearly lies in the time-line to achieve an impact upon an incident. The following timeline approximates the various stages of the proposed system:



As evidenced by the preceeding time-line, the proposed response system significantly reduces the time to definitive action. The elimination of any single element thus prolongs the definitive action until the next corresponding capability become operational.

THE FUNDING PROCESS

Phases two-A (Fire District Decontamination Companies) and Two-B (Hospital Decontamination Companies) of this proposal are fully dependent upon federal funding. This funding would appropriately be sought through the Department of Justice, Office of State and Local Domestic Preparedness Support grants as previously referenced.

To qualify for grant money, each state must develop practical, multi-year plans for addressing terrorism response needs. The first step in this process is an assessment that requires information on current capabilities and potential requirements. The Office of Justice Programs is providing funding to states for their assessments and strategies, their completion being a condition of state acceptance of funds.

The Massachusetts Emergency Management Agency has been designated as the Administrative Agency for this grant process for Massachusetts. As the Administrative Agency, MEMA is responsible to:

1. Develop a three-year statewide strategic plan
2. Oversee needs/capabilities assessment
3. Allocate grant funds

The assessment and strategy process is required to address a three-year period from FY 99 through FY 01 (Federal Fiscal Year Oct. – Sept.). It is important to note that the funds identified for each state are held from year to year and do not expire if the process is not completed in that year. This process includes as its steps:

- Jurisdiction Identification
- Coordination
- Public Health Assessments
- Threat Assessments
- Capabilities and needs Assessment
- Jurisdiction prioritization
- Three-year projections
- Recommendations on State/Local WMD incident response efforts

The DOJ provides assistance and guidance in this development through its Technical Assistance Division or through the published “Guidance for the Development of a three-year statewide Domestic Preparedness Strategy” and its “ Assessment and Strategy Development Tool Kit.” Both of these documents are available on the DOJ web site at www.osp.usdoj.gov/osldps and are accordingly not contained herein.

A NECESSARY CONCENSUS

To develop a system approach that provides true effectiveness, this plan must gain the acceptance of the entire community of emergency responders to terrorist incidents and of the healthcare community. What is sought is to develop a continuum, providing rapid response to mass casualty contamination needs to both reduce the number and severity of casualties and to gain rapid control of the incidents.

By coming together behind this plan, stakeholders establish a position that collectively we can provide an effective response that is not community specific. Just as the current Hazardous Materials Response system in Massachusetts seeks to provide equal access and capabilities to all communities of the Commonwealth, so to this proposal seeks to provide all communities with a system to support their crisis needs.

APPENDIX A

**HAZARDOUS MATERIALS/CHEMICAL OR BIOLOGICAL
WEAPON DECONTAMINATION SYSTEM
RECCOMENDATION**

Hazardous Materials/Chemical or Biological Weapons Decontamination System Recommendation

In response to requests for recommended equipment by Fire Departments in counties that are qualified for grant money under the Department of Justice, Office of Justice Assistance Domestic Preparedness Grant, the following program is offered for consideration.

The Massachusetts Department of Fire Services, Hazardous Materials Division is currently retrofitting its nine (9) Operational Response Units with a highly capable mass decontamination system. This system will provide a means of decontaminating high volumes of victims and emergency personnel of hazardous materials. Pictured in Figures 1 – 4, the system can utilize a rail configuration to allow for decontamination of non-ambulatory persons, or can be operated with the rails open to decontaminate ambulatory patients or emergency personnel.

The Hazardous Materials Division Decontamination System is modular, portable and highly flexible in its application. The system can also be stored in just a few compartments of the Operational Response Unit. Elements of this system also constitute most of the necessary equipment for emergency Incident Rehabilitation and can serve to support other protracted operations.

Based upon possible scenarios, a desire to meet additional local needs, and in consideration of this Departments ability to provide other applicable resources to communities, the Department of Fire Services is recommending that local fire departments qualifying for grant money purchase and develop a modified version of this decontamination system. The reasons for this recommendation are as follows:

1. The addition of multiple local decontamination systems greatly enhances the statewide ability to manage mass decontamination operations.
2. The recommended system can support or be supported by the state system.
3. The low cost of this system will allow qualified counties to purchase several complete systems and issue them to several local fire departments.



Fig. 1

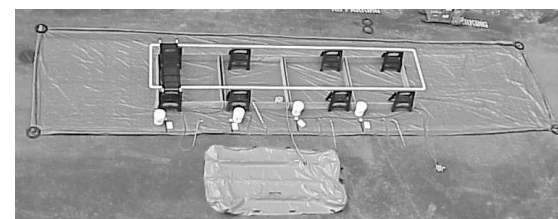


Fig. 2



Fig. 3

4. The elements of the decontamination system will greatly assist local fire departments in developing an emergency Incident Rehabilitation capability for fire fighters at the local level.
5. Elements of the system can be used for other fire service emergencies such as evacuations, lost person searches, special events, mass casualty incidents and others.
6. Each system should be able to be stored on existing apparatus or on "Special Hazard" trailers or vehicles that exist in many departments.

The recommended system will not contain the elements for decontamination of non-ambulatory patients. The volume of equipment necessary for this capability would eliminate its storage and transport on most existing apparatus. It is also believed that in the intended role, that of decontaminating patients from a chemical or biological incident, non-ambulatory patients will most likely be in the contaminated area, thus requiring entry by the Hazmat team for rescue. Under this scenario, the full decontamination set carried on the Hazmat Operational Response Units will be on-scene and deployable.



Fig. 4

The following table describes the elements of this system, quantity of each item needed, and the price paid for the element. This list is intended to provide departments with plans to produce a decontamination system based upon those developed by this department. It is in no way considered a requirement. Upon request, the Hazardous Materials Division can identify the vendors used for its purchases and model numbers, etc.

Quantity	Item	Cost	Total Cost
3	Wooden Decon Pools	\$25	\$75.00
	1/2" x 4' x 8' CDX Plywood		
2	3/4"X4'X8' CDX Plywood	\$40	\$80.00
4	2"X4"X8' Pine	\$4	\$16.00
1	40' x 60' Tarp	\$100	\$100.00
2	50' x 5/8" garden hose	\$35	\$70.00
	for hot and cold water		
6	3/4" full port ball valves	\$9.5	\$57.00
20	3/4"-1" male couplings	\$2	\$40.00
20	3/4"-1" female couplings	\$1.5	\$30.00
6	3/4" x 2" nipples	\$0.3	\$1.80
6	3/4" x 3/4" x 3/4" reducing riser tee	\$0.85	\$5.10
26	stainless steel clamps 1/2"-1 1/4"	\$0.5	\$13.00
8	3/4" hose caps	\$1	\$8.00
6	3/4" x 3/4" x 1/2" male hose x mip	\$2.25	\$13.50
6	Water Wand	\$10	\$60.00
6	5 gal pails	\$5	\$30.00

6	20" brushes	\$5	\$30.00
1	20' x 100' roll plastic 6 mil	\$37	\$37.00
Quantity	Item	Cost	Total Cost
1	1 1/2" x 6 outlet manifold	\$455	\$455.00
2	15' x 10'Ez-up Tents	\$550	\$1,100.00
2	Heavy duty carry bags w/ 2 handles	\$55	\$110.00
4	15' walls	\$115	\$460.00
2	10' walls w/ center zipper	\$90	\$180.00
2	10' walls w/o center zipper	\$80	\$160.00
1	10' rain gutter	\$60	\$60.00
8	20lb. Sand bags with quick release pins	\$42	\$336.00
8	14" heavy duty metal stakes with quick release pins	\$27	\$216.00
4	4' tent lights	\$250	\$1,000.00
8	Cases of xxl Tyvek suits w/ booties and hood	\$140	\$1,120.00
Sub Total			\$5,865.40
Recommended Optional Equipment			
1	Tent Heater	\$1000	\$1,000.00
1	Hot Water Heater	\$8500	\$8,500.00
Sub Total			\$9,500.00
Total			\$15,343.40

Equipment Descriptions

Tentage

The Department of Fire Services opted to use “E-Z up 10’X15’ (note; Fig. 4 shows set-up using 4 tents, recommended for this set-up is 2 tents) tents with sides. The recommended equipment list includes several options and accessories for these tents, such as sides, stakes, sandbags and lights. Other products are available and may be considered for use, including inflatable buildings. Important factors on selection are:

- Storage size
- Transportability
- Durability
- Ease of set-up
- Functional size
- Protection from weather
- Privacy

Ground Cover

The Department of Fire Services opted to use 40’X60’ poly-tarps. Given the smaller footprint of this recommended decontamination system, a smaller size tarp may be suitable. The tarp must provide over-spill containment from the decon pools. While many systems are available for containment, it was determined that simply rolling the sides of the tarp to form a berm was easiest, and sufficient.

Decontamination Pools

The Department of Fire Services opted to use plywood forms to construct the decon pools. These are easily stored and have the rigidity necessary to withstand decontamination use. These pools are “lined” with 6 mil. thickness plastic sheeting. While other types of decon pools are used; this configuration was felt to provide the portability and durability necessary for emergency operations.



Fig. 5



Fig. 6

It is important to note that the decontamination system used by the Hazardous Materials Teams includes a battery operated pump and two 2500-gallon water bladders for collection of contaminated water. The items were omitted from this recommendation because of the cost and storage of these units. It is anticipated that the ability of the Hazardous Materials Response Division to supply them at the scene was sufficient. The plywood decontamination pools are constructed by cutting four sides measuring 1'X4'. Each side is cut with a slot 3" from each end, measuring 6"x 1.5" (see fig. 5). These slots allow the sides to fit square and flush (see Fig. 6). A platform is constructed to sit in the center of each pool. This platform is constructed using a 18"X72" sheet of plywood mounted on 4 pieces of 6'X2"X4 lumber and two 18"X2"X4". After assembly, the plastic sheeting is draped over the pool (see Fig. 7) such that a depression is formed around the platform. The plastic is "clipped" to the pool form using cut pieces of PVC pipe (see Figs. 8&9).



Fig. 7

Water Systems

The water system for decontamination is largely made from parts that are available at a, well-stocked, hardware store. The exception to this rule is the 1-½"X6 manifold.

Optional Items

Two items that significantly increase the cost of these systems are the tent heater and water heater. Both of these items carry the additional factor of requiring propane gas, which may reduce the practicality of their inclusion. If a department wishes to take advantage of this system to also provide emergency incident rehabilitation, consideration should be given to the tent heater, despite its inherent drawbacks.

Inclusion of the water heater as a recommendation was subject of some discussion. While water heaters ultimately were included in the list, departments may wish to not consider this in their own program. These units are expensive and, again, require propane for operation. During a large-scale incident, the Hazardous Materials Response Division has additional heaters that can be deployed from its headquarters in Stow. The time-to-deployment of these units is geography specific and may or may not negate the need for local water heaters. Small heaters, as described in this list, are carried on the Hazmat Operational Response Units. These units, however, produce only enough hot water to support one decon operation.



Fig. 8

Training

Emergency decontamination training can be sufficiently included in the Hazardous Materials First Responder-Operations Level training. Additional training specific to Weapons of Mass Destruction can be obtained through the Massachusetts Fire Fighting Academy. The Hazardous Materials Division of DFS has plans to develop a training presentation, based upon this system.



Fig. 9

APPENDIX B

TABLE OF RESPONSE TIMES

HOSPITAL	CITY	ORU #12 BOURNE	ORU #13 WESTWOOD	ORU #22 EVERETT	ORU #32 NATICK	ORU #33 WORCESTER	ORU #42 CHICOPEE	ORU #52 PITTSFIELD	ORU #62 LOWELL	ORU #63 FITCHBURG
Athol Memorial	Athol	2:24	1:36	1:33	1:30	1:01	1:25	2:39	1:11	0:39
Sturdy Memorial	Attelboro	:56	0:39	0:58	0:54	1:07	1:50	2:49	1:12	1:22
Deaconess Nashoba	Ayer	1:48	1:01	0:50	0:59	0:45	1:48	2:41	0:32	0:30
Beverly	Beverly	1:33	0:55	0:34	0:55	1:29	2:10	3:08	0:50	1:22
Beth Israel- Deconess	Boston	1:03	0:25	0:13	0:27	0:59	1:40	2:40	0:45	1:12
Boston Children's	Boston	1:03	0:25	0:13	0:27	0:59	1:40	2:41	0:45	1:12
Boston Medical Center	Boston	:57	0:27	0:12	0:31	1:01	1:42	2:41	0:43	1:12
Brigham & Women's	Boston	1:03	0:25	0:13	0:27	0:59	1:40	2:41	0:45	1:12
Carney	Boston	:53	0:24	0:19	0:37	1:09	1:56	2:50	0:51	1:20
Faulkner	Boston	1:05	0:19	0:25	0:21	0:58	1:39	2:39	0:40	1:06
Mass Eye & Ear	Boston	1:00	0:30	0:08	0:29	1:01	1:43	2:42	0:41	1:10
Mass General	Boston	1:00	0:30	0:08	0:29	1:01	1:43	2:42	0:41	1:10
New England Medical Center	Boston	:57	0:26	0:10	0:26	0:59	1:40	2:49	0:41	1:10
VA Boston	Boston	1:04	0:28	0:11	0:26	0:58	1:39	2:38	0:43	1:11
St. Elizabeths Medical Center	Brighton	1:03	0:27	0:17	0:23	0:55	1:36	2:36	0:42	1:08
Brockton	Brockton	:53	0:31	0:41	0:47	1:23	2:04	3:04	1:56	1:31
Good Samaritan Medical Center	Brockton	:45	0:23	0:33	0:38	1:14	1:55	2:55	0:56	1:22
Lahey Clinic Burlington	Burlington	1:19	0:31	0:21	0:32	1:06	1:47	2:46	0:23	0:58
Mount Auburn	Cambridge	1:06	0:32	0:12	0:26	0:58	1:39	2:39	0:38	1:00
Cambridge	Cambridge	1:04	0:31	0:09	0:27	0:59	1:40	2:40	0:39	1:02
Clinton	Clinton	1:41	1:08	1:03	0:47	0:27	1:25	2:24	0:42	0:26

HOSPITAL	CITY	ORU #12 BOURNE	ORU #13 WESTWOOD	ORU #22 EVERETT	ORU #32 NATICK	ORU #33 WORCESTER	ORU #42 CHICOPEE	ORU #52 PITTSFIELD	ORU #62 LOWELL	ORU #63 FITCHBURG
Emerson	Concord	1:24	0:41	0:36	0:42	0:43	1:43	2:48	0:33	0:35
Whidden Memorial	Everett	1:09	0:42	0:04	0:39	1:09	1:52	2:52	0:44	1:11
St. Anne's	Fall River	:49	0:56	1:06	1:12	1:20	2:08	3:07	1:30	1:50
Charlton Memorial	Fall River	:49	0:57	1:07	1:12	1:21	2:08	3:03	1:30	1:50
Falmouth	Falmouth	:23	1:29	1:38	1:44	2:02	2:45	3:44	2:03	2:17
H.A. Burbank	Fitchburg	2:01	1:12	1:10	1:06	0:37	1:36	2:35	0:47	0:02
Metro-West Framingham	Framingham	1:24	0:34	0:41	0:10	0:39	1:22	2:22	0:49	0:56
Henry Heywood Mem.	Gardner	2:08	1:19	1:17	1:13	0:44	1:50	3:01	0:54	0:22
Addison Gilbert Fairview	Gloucester	1:42	1:06	0:46	1:07	1:40	2:21	3:21	1:01	1:33
	Great Barrington	3:12	2:47	2:52	2:33	2:05	1:12	:38	2:54	2:36
Franklin Medical Center	Greenfield	2:39	2:14	2:09	2:08	1:47	0:49	1:45	1:49	1:17
Hale	Haverhill	1:46	1:09	0:52	1:10	1:15	2:14	3:14	0:35	1:08
Holyoke	Holyoke	2:23	1:50	1:55	1:36	1:08	0:10	1:11	1:57	1:39
Cape Cod	Hyannis	:27	1:32	1:35	1:48	2:19	3:02	4:02	2:06	2:35
Lawrence General	Lawrence	1:35	0:59	0:39	1:00	1:04	2:04	3:04	0:24	0:58
H.A. Leominster	Leominster	1:52	1:03	0:58	0:57	0:28	1:26	2:26	0:38	0:09
Lowell General	Lowell	1:41	0:49	0:45	0:49	0:54	1:54	2:54	0:05	0:48
Saint's Memorial	Lowell	1:41	0:45	0:39	0:46	0:54	1:54	2:53	0:03	0:47
Union	Lynn	1:24	0:46	0:22	0:46	1:20	2:01	3:01	0:41	1:13
Umass/Memorial Marlboro	Marlboro	1:26	0:53	0:58	0:31	0:25	1:22	2:21	0:42	0:42
Lawrence Memorial	Medford	1:06	0:38	0:09	0:38	1:12	1:51	2:50	0:36	1:04
Melrose Wakefield	Melrose	1:12	0:44	0:11	0:44	1:19	1:57	2:59	0:38	1:12

HOSPITAL	CITY	ORU #12 BOURNE	ORU #13 WESTWOOD	ORU #22 EVERETT	ORU #32 NATICK	ORU #33 WORCESTER	ORU #42 CHICOPEE	ORU #52 PITTSFIELD	ORU #62 LOWELL	ORU #63 FITCHBURG
Holy Family	Methuen	1:37	0:57	0:37	0:58	1:05	2:05	3:04	0:25	0:59
Milford Whitins	Milford	1:14	0:49	1:01	0:37	0:38	1:26	2:24	0:59	0:58
Regional										
Milton	Milton	:56	0:23	0:22	0:39	1:15	1:58	2:55	0:53	1:23
Nantucket	Nantucket	FERRY REQUIRED, UNABLE TO FORECAST TIME								
Cottage										
Metro-West	Natick	1:15	0:22	0:40	0:02	0:48	1:29	2:28	0:46	1:05
Natick										
Deaconess	Needham	1:04	0:11	0:33	0:15	0:57	1:38	2:37	0:38	1:04
Glover										
St Luke's	New Bedford	:36	1:06	1:16	1:21	1:37	2:25	3:24	1:39	1:59
Anna Jaques	Newburyport	1:48	1:09	0:47	1:10	1:26	2:24	3:24	0:46	1:19
Newton-Wellesly	Newton	1:07	0:15	0:27	0:14	0:50	1:31	2:31	0:32	0:58
Caritas	Norfolk	:58	0:25	0:50	0:42	1:06	1:47	2:43	1:49	1:16
Southwood										
North Adams	North Adams	3:45	3:50	3:39	3:35	3:07	2:10	:42	3:19	2:46
Regional										
Cooley	Northampton	2:38	2:08	2:12	1:53	1:25	0:28	1:17	2:15	1:44
Dickinson										
Caritas Norwood	Norwood	1:09	0:09	0:39	0:32	1:06	1:47	2:47	0:48	1:14
Martha's	Oak Bluffs	FERRY REQUIRED, UNABLE TO FORECAST TIME								
Vineyard										
Wing Memorial	Palmer	2:04	1:32	1:37	1:18	0:50	0:26	1:25	1:40	1:21
Lahey Clinic	Peabody	1:27	0:49	0:27	0:49	1:23	2:04	3:03	0:44	1:16
North										
Bershire Medical	Pittsfield	3:18	2:48	2:53	2:33	2:05	1:12	:03	2:55	2:36
Center										
Jordan	Plymouth	:23	0:54	0:56	1:09	1:46	2:27	3:27	1:28	1:54
Quincy Medical	Quincy	:51	0:23	0:22	0:39	1:12	1:56	2:52	0:53	1:22
Center										
North Shore	Salem	1:28	0:51	0:26	0:52	1:25	2:06	3:06	0:47	1:18
Childrens										
Somerville	Somerville	1:07	0:35	0:08	0:32	1:04	1:45	2:44	0:39	1:01

HOSPITAL	CITY	ORU #12 BOURNE	ORU #13 WESTWOOD	ORU #22 EVERETT	ORU #32 NATICK	ORU #33 WORCESTER	ORU #42 CHICOPEE	ORU #52 PITTSFIELD	ORU #62 LOWELL	ORU #63 FITCHBURG
Harrington Mem.	Southbridge	2:02	1:19	1:21	1:04	0:36	0:48	1:47	1:26	1:07
Bay State Medical Center	Springfield	2:21	1:48	1:52	1:33	1:06	0:10	1:13	1:55	1:37
Mercy Morton	Springfield	2:20	1:47	1:51	1:32	1:04	0:08	1:15	1:54	1:35
Deaconess Waltham	Taunton	:41	0:48	0:54	1:04	1:15	1:57	2:57	1:22	1:30
Mary Lane Tobey	Waltham	1:14	0:22	0:27	0:22	0:55	1:36	2:36	0:32	0:58
Hubbard Reg.	Ware	2:15	1:43	1:45	1:28	0:55	0:36	1:36	1:45	1:16
Noble	Wareham	:19	1:03	1:13	1:19	1:36	2:19	3:19	1:37	1:52
South Shore	Webster	1:54	1:13	1:13	0:58	0:22	1:06	2:04	1:09	0:53
Winchester Memorial Health Center	Westfield	2:29	1:58	2:02	1:43	1:15	0:22	1:03	2:05	1:46
Worcester Medical Center	Weymouth	:43	0:26	0:28	0:41	1:18	1:59	2:58	0:59	1:25
Univ. of Mass.	Winchester	1:16	0:40	0:16	0:41	1:15	1:56	2:55	0:34	1:07
	Worcester	1:42	1:02	1:04	0:44	0:02	1:01	2:01	0:51	0:34
	Worcester	1:44	1:01	1:04	0:46	0:03	1:01	2:01	0:50	0:34
	Worcester	1:40	1:05	1:07	0:42	0:06	1:05	2:04	0:55	0:38

APPENDIX C

OVERVIEW OF THE MASSACHUSETTS DEPARTMENT OF FIRE SERVICES HAZARDOUS MATERIALS EMERGENCY RESPONSE DIVISION



MASSACHUSETTS HAZARDOUS MATERIALS RESPONSE

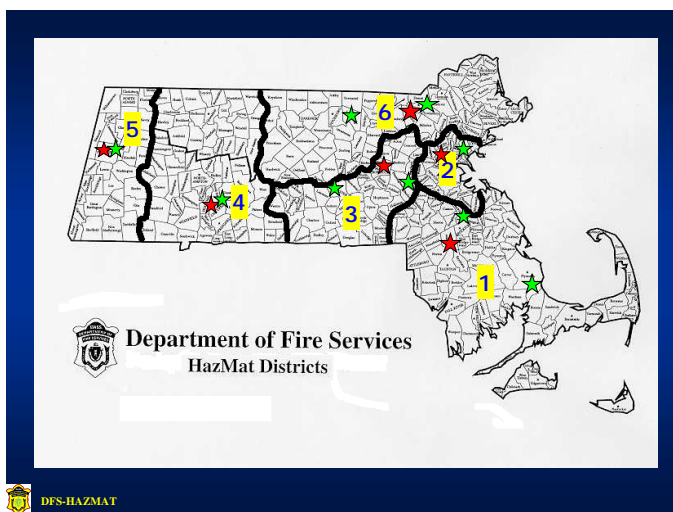
An Innovation in Responding to Modern Emergencies

BACKGROUND

The requirements for Hazardous Materials Response are established under Federal Laws (99 Pl. 499 (1986)) known as the Superfund Amendments and Reauthorization Act (SARA) and corresponding Federal Regulations. Title III of SARA requires that each state and each community establish plans for responding to chemical emergencies and provide methods to inform the community of hazards present in each city and town. SARA Title 1 established a requirement and responsibility to assure training and competence for emergency response to hazardous materials releases or threatened releases. The Statute required the Occupational Safety and Health Administration (OSHA) to issue regulations describing these training requirements, assigning duty to insure competence and penalty for non-compliance (29 CFR 1910.120). To enforce the intent of this law on non-OSHA states, such as Massachusetts, the statute required the Environmental Protection Agency to co-issue the regulations (40 CFR 311).

Standards for training of emergency response personnel and for the management of responses were published by the National Fire Protection Association as Standards 472 and 473. These standards have been accepted nationally as the standard for the fire service and for hazardous materials emergency response training.

The requirements of emergency response in training and personnel were significant factors in the development of the Regional Hazardous Materials Response system that has evolved into the State Hazardous Materials Response system. The cost to each community to replicate the required response capability as a local system, as would be required in the absence of the state system, would be astronomical. A major advantage of the state system is that it draws only a few personnel from each participating community and provides the required response capability to all Massachusetts cities and towns. While a few Massachusetts cities, such as Boston and Springfield, have a sufficient number of incidents to warrant



the expense of maintaining local capabilities, most do not.

ELEMENTS OF THE SYSTEM

The Hazardous Materials Response Division of the Department of Fire Services evolved from separate teams operated in the various fire districts of the state. At present, there are six (6) districts within the Hazardous Materials Response Division of the Department of Fire Services (see Fig. 1).

Each Hazardous Materials Response teams is comprised of three (3) vehicles that are owned, supplied and maintained by the Commonwealth. Upon request, and dependent upon the scale of an incident some combination of one to three of these units are activated and staffed by certified Hazardous Materials Technicians who are firefighters employed by participating fire departments.

Each district has one (1) Technical Operations Module (TOMs) which is deployed for hazard risk assessment and incident management. The TOMs (Fig. 2) unit carries a series of on-board computers to access an array of technical databases and chemical incident management systems to identify the risks from a given chemical and provide recommendations in managing its release. TOMs units also carry instruments for measuring atmospheric content and determining danger levels. Finally, these units are equipped with a wide array of communications capabilities to provide the interagency coordination necessary to manage chemical incidents

One or two Operation Response Units (ORUs) are assigned to each district, depending upon district size. The ORUs (Fig.3) contain specialized personal protective equipment, decontamination equipment and containment equipment to allow the technicians to enter the hazardous environment, mitigate the hazard and to be properly decontaminated. One or two ORUs may be dispatched to an incident based upon the size of the incident, complexity of the mitigation measures to be undertaken and the expected volume of personnel and equipment needed.

Fig. 2



Fig. 3



HAZARDOUS MATERIALS RESPONSE

Hazardous Materials Incidents can come from almost any source. While the scenario of a Hazardous Materials Incident that generally comes to mind may involve a large chemical plant, most are less

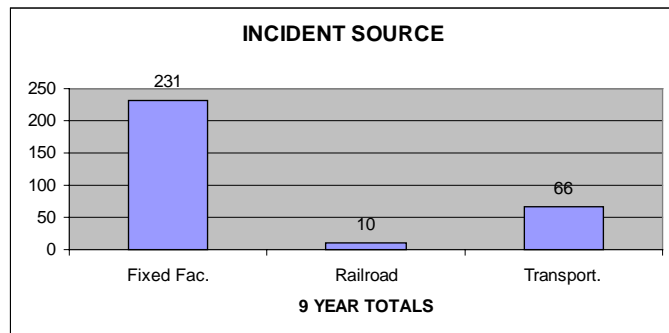


Fig. 4

spectacular and much closer to home. Hazardous materials are used in many industries including local dry cleaners and hardware stores and can even occur in private homes. Riding along any highway and many local roads, one will see a variety of placards on trucks carrying products used everyday in a modern society. Any of these sources is a potential hazardous materials incident. Figure 4 illustrates the incident source history of the past nine years.

The Massachusetts Hazardous Materials Response Division has responded to incidents throughout the Commonwealth. While the potential for incidents increases in large urban areas with significant commerce, the nature of these incidents has resulted in response to even the most rural of communities. On average, the system responds to 37 chemical releases or potential chemical releases per year. The chart in fig. 1 provides a graphic representation of Hazardous Materials Response activity over the past nine years.

As evidenced by Fig. 5, an increase in incidence preceded state involvement in the Hazardous Materials Response program and contributed to the development of support under the Department of Fire Services. Trends thus far for 1999 reflect a probable continuation of the average.

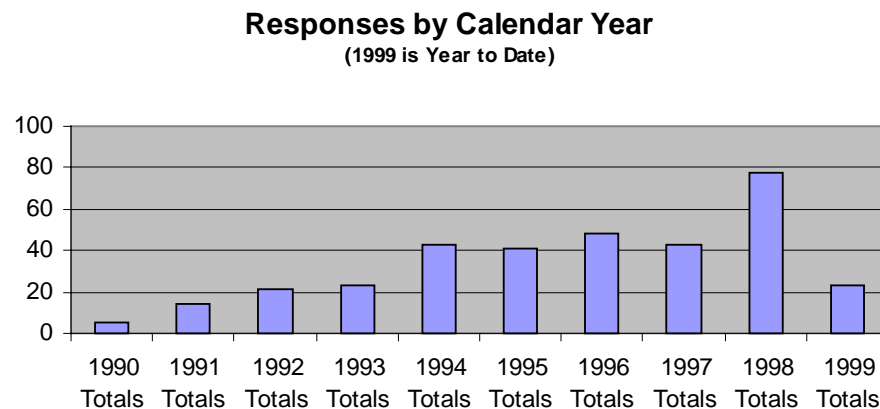


Fig. 5

Response data and statutory requirements present an imperative to the presence of a Hazardous Materials Response System in Massachusetts. The experiences of the system illustrate far more effectively the value of the innovative program that the Massachusetts Hazardous Materials Response Division has become. In concert with the many fire departments that provide personnel to support this system, Massachusetts can provide a response to its communities far beyond what they could sustain independently.

APPENDIX D

**RESPONSE AGREEMENT BETWEEN DFS AND MNG
RELATIVE TO WMD**

INTENTIONALLY OMMITTED

APPENDIX E

LETTERS OF SUPPORT AND ENDORSEMENTS

INTENTIONALLY OMMITTED